



BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Subsidiary Diploma in Applied Science Pearson BTEC International Level 3 Foundation Diploma in Applied Science Pearson BTEC International Level 3 Diploma in Applied Science Pearson BTEC International Level 3 Diploma in Biomedical Science Pearson BTEC International Level 3 Diploma in Environmental Science Pearson BTEC International Level 3 Extended Diploma in Applied Science Pearson BTEC International Level 3 Extended Diploma in Biomedical Science Pearson BTEC International Level 3 Extended Diploma in Environmental Science
Unit number and title	Unit 14: Genetics and Genetic engineering
Learning aim(s) (For NQF only)	C: Explore the principles of inheritance and their application in predicting genetic traits
Assignment title	Human inheritance and predicting genetic traits
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	As a trainee lab technician working for a medical research company, you must be able to predict patterns of inheritance and analyse correlations between expected and observed results. Your company offer work placements for the sixth form students. You have been asked to help the sixth form students understand how an expected ratio of inheritance can be different to an observed ratio and how statistical tests can determine if this difference is significant, caused by something or if it is just due to chance.
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Task	You are required to make valid predictions of patterns of monohybrid and dihybrid inheritance and then carry out practical investigations to test your predictions. You must analyse your data to explain the correlation between the observed patterns of inheritance and the predictions made. You must investigate the inheritance of genetic conditions and
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apply

Mendel's laws of inheritance to non-affected individuals, carriers and affected individuals.

In order to do this, you must:

- Follow instructions to



	competently carry out investigations to collect valid and reliable data for one monohybrid and one dihybrid phenotypic ratio. You should demonstrate a very low error rate and gain results close to the expected. • Produce a write up of your investigations. • Use the data from your investigations, supplemented by data for peers (if necessary), to effectively apply the chi-squared test to analyse the correlation between the observed and expected phenotypic results. You need to identify if the ratios obtained are statistically significant or due to chance. • Predict the outcomes of crosses between <i>non-affected</i>, <i>affected</i> and <i>carriers</i> of genetic disorders. This must include considering the inheritance of a monohybrid disorder and a dihybrid disorder but does not have to be limited to humans. • You must use the data from your investigations and researched case studies to make these predictions and you must include an explanation of why the observed ratio for each example might not be exactly as would be expected. • Analyse data from case studies to explain the genotypic and phenotypic ratios for crosses involving genetic conditions in humans or animals. The case studies must include monohybrid and dihybrid conditions and must consider the outcomes of crosses involving <i>unaffected</i>, <i>affected</i> and <i>carrier</i> individuals. Conditions to consider could include Huntington's disease, sickle cell anaemia or cystic fibrosis and linked genes (e.g. colour blindness or haemophilia). Use genetic diagrams (e.g. Punnett squares) to represent the genetic crosses. • Apply Mendel's laws of independent assortment and segregation to analyse the results of the genetic crosses. You should make clear conclusions based on the results. You must use correct scientific terminology throughout your work including the following terms: • allele, genotype, phenotype, heterozygous, homozygous, carrier, affected/sufferer, non-affected/non-sufferer.
Checklist of evidence required	• a write up to include the data from your investigations including an accurate prediction and analysis of the outcomes for both monohybrid and dihybrid inheritance of carrier and affected individuals and Mendel's laws • an observation sheet to validate the level of competency when investigating inheritance



- explanation and genetic diagrams of monohybrid genetic crosses for non-affected, carriers and affected individuals for both independent and linked genes

Criteria covered by this task:

Unit/Criteria reference	To achieve the criteria you must show that you are able to:
C.D3	Make valid predictions on patterns of monohybrid and dihybrid inheritance and variation using principles of inheritance.
C.M4	Analyse data to explain the correlation between observed pattern of monohybrid and dihybrid inheritance.
C.M5	Apply Mendel's laws of inheritance to the results of genetic crosses.
C.P4	Carry out investigations to collect and record data for mono and dihybrid phenotypic ratios.
C.P5	Explain genetic crosses between non-affected, affected and carriers of genetic conditions.

Sources of information to support you with this Assignment

<http://www2.le.ac.uk/departments/genetics/vgec/schoolscolleges/topics/inheritancepatterns>

<http://www.science.oregonstate.edu/genbio/otherresources/punnett%20squares.htm>

<http://www.nature.com/scitable/definition/principle-of-independent-assortment-302>

<http://www.shmoop.com/genetics/chi-squared-test.html>

<http://www.ygyh.org/cf/inherited.htm>

<https://www.dnalc.org/view/15940-What-is-color-blindness-.html>

<https://www.learner.org/interactives/dna/genetics6.html>

<http://www.contentextra.com/lifesciences/files/topicguides/Topic-guide-7.5-Patterns-of-inheritance.pdf>

<https://www2.palomar.edu/users/warmstrong/lmexer4.htm>

<http://www.open.edu/openlearn/science-maths-technology/science/biology/meiosis-and-mitosis/content-section-1.3.1>

Above are some examples of websites. Further useful resources may be found at:

<http://qualifications.pearson.com/en/support/published->



[resources.html#step1](#)